European Commission

JRC CONFERENCE AND WORKSHOP REPORTS

2016 User Workshop of the Copernicus Emergency Management Service – Summary Report

Workshop held on 15-16 March 2016 at JRC Ispra (IT)

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2016

This publication is a Conference and Workshop report by the Joint Research Centre (JRC), the European Commission's in-house science and knowledge service. It aims to provide evidence-based scientific support to the European policy-making process. The scientific output expressed does not imply a policy position of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication.

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JRC102634
ISBN 978-92-79-63450-5
doi:10.2788/2672

Luxembourg: Publications Office of the European Union

How to cite: Wania A., Broglia M., Kucera J., Spruyt P., Rossi M., Spinoni J., Weissteiner C., Dorati C., Steel A., Louvrier C.; 2016 User Workshop of the Copernicus Emergency Management Service – Summary Report; ISBN 978-92-79-63450-5, doi:10.2788/2672

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List of abbreviations and definitions

AOI	Area of Interest (area of analysis)
AU	Authorised User
CSC-DA	Copernicus Space Component - Data Access
DG ECHO	European Commission Directorate General Humanitarian Aid & Civil Protection
DG GROW	European Commission Directorate General Internal Market, Industry, Entrepreneurship and SMEs (former DG ENTR)
DWH	ESA's Data Warehouse
EC	European Commission
EEA	European Environment Agency
EEAS	European External Action Service
EFAS	European Flood Awareness System (EMS Early Warning component)
EFFIS	European Forest Fire Information System (EMS Early Warning component)
EndU	End User
EMS	Copernicus Emergency Management Service
EMSN	Activation code for RRM activations
EMSR	Activation code for RM activations
EMSV	Emergency Management Service Validation (activation code)
EO	Earth Observation
ERCC	Emergency Response Coordination Centre operating within DG ECHO
ESA	European Space Agency
GIO	GMES Initial Operations
JRC	European Commission Directorate General Joint Research Centre
M1	Module 1 of EMS Validation - Field data collection in rapid mode
M2	Module 2 of EMS Validation - Product validation
M3	Module 3 of EMS Validation - Product valuation and impact analysis
M4	Module 4 of EMS Validation - Participation to a meeting
RM	Rapid Mapping module of the EMS Mapping component
RRM	Risk & Recovery Mapping module of the EMS Mapping component
SFTP	Secure File Transfer Protocol
SP	Service Providers (providing RM, RRM and Validation services)
UAV	Unmanned Aerial Vehicle
VHR	Very high resolution data

Acknowledgements

The workshop organisers would like to thank all participants for the fruitful exchange during this workshop. The annual user workshop is a unique occasion to bring together users and all actors on the service side, i.e. the Commission as service coordinator and the service and data providers. Special thanks go to the users and service providers for their valuable input, and the JRC EMS Mapping team who prepared and shaped the content of this workshop and its main output. We also thank all those participants who commented on the first draft of this document and the NEXTSPACE consortium for their notes.

We would like to extend our gratitude to those who made this workshop even possible. We thank our colleagues from the EC Directorate Generals GROW and ECHO for their input and to the JRC for hosting it. In particular we would like to thank the JRC Disaster Risk Management Unit (Global Security and Crisis Management Unit at the time of the workshop), namely Tom de Groeve (acting unit head) for hosting the workshop, Paola Iaconinoto, Regina Corradini and Cristina Mottalini for the smooth administrative organisation and logistics, and the group of the JRC Visitor's Centre for their warm welcome and for hosting us during these 1.5 days.

Abstract

This report summarises the User Workshop of the Copernicus Emergency Management Service (EMS) which was held on 15-16 March 2016 at the Joint Research Centre (JRC) in Ispra, Italy. The workshop focused on the mapping component of EMS and aimed at reviewing the service after four years of operations and at addressing its future evolution. Key to the discussion was the users' perspective on the service. The workshop was attended by all stakeholders involved in EMS Mapping, namely its users, the coordinating three EC Directorate Generals (JRC is the technical coordinator), service providers and stakeholders involved in data access (ESA, EEA).

The discussion during the 1.5 days showed that overall users are satisfied with the service. However, a number of suggestions for improvements were raised which would render the service more usable and improve the integration of products in user's workflows. It also showed that while on some aspects users seem to agree, they diverged on others. Main priorities for the future evolution are fast(er) product delivery, dissemination of products through web services, access to the imagery used in the production, improvement of the product portfolio (more technical products, tailoring to specific risks), increasing awareness about the service and what it provides. The EC will use the results from this workshop as input to its work on the evolution of the service in years to come.

The workshop agenda and presentations can be retrieved from the website: http://emergency.copernicus.eu/mapping/ems/user-workshop-copernicus-emergency-management-service-user-perspective-current-status-future

1 Introduction

This report summarises the 2016 edition of the User Workshop of the Copernicus Emergency Management Service (EMS), one of the six Copernicus core services. The workshop was held on 15-16 March 2016 at the European Commission (EC) Joint Research Centre (JRC) in Ispra, Italy. The workshop focused on the mapping component of EMS and aimed at reviewing the service after four years of operations and at addressing its future evolution. Key to the discussion during the workshop was the users' perspective on the service.

The workshop brought together all stakeholders involved in EMS Mapping, namely EMS Authorised Users and End Users, the three EC Directorate Generals involved in the service coordination (GROW, ECHO, JRC), service providers and stakeholders involved in data access (the European Space Agency for space data and the European Environment Agency for reference or in-situ data).

The JRC is implementing the service in the frame of the Administrative Agreement and related sub-cross delegation with DG GROW (JRC No. 33539-2014 NFP). Since the start of operations in April 2012 JRC is the technical coordinator of the service. In February 2015 the second phase started with some improvements of the service portfolio. The service is planned to continue in the current set-up until 2019 with service framework contracts for Rapid Mapping and Risk & Recovery Mapping ending in January 2019, and for Validation ending in January 2020. In view of this, but not only, the EC is addressing the evolution of the service. Besides changes that can be implemented in the current set-up this should also provide the basis for drafting the next framework contracts (third phase).

The user workshop is one important channel for feedback collection in addition to the more frequent feedback collection through user feedback forms (after each RM and RRM service activation) and during interviews in the frame of the validation exercises (for selected activations only). It is unique in the sense that it allows collecting interactive feedback and not only from those who are frequently using the service but also from those who have for one reason or another not yet used the service. In order to collect feedback from the last group, an online survey was launched before the workshop. In addition, some of those who have actually used the service in the recent past were invited to present their experience in a dedicated session.

The workshop was structured to give room to both users to present their experience with the service and to all participants for discussing the current status of the service (day 1) and sharing views on its future (day 2). This report summarises the presentations given and the discussion during the 1.5 days. In particular it aims at providing an overview on all comments received or issues raised which will allow addressing those in the near future.

2 Summary of Sessions

2.1 Introductory talks

(a) Welcome notes

JRC and DG GROW welcomed the 62 participants who travelled to JRC from 20 different countries.

In his welcome note the head of the hosting JRC unit Tom De Groeve recalled that the workshop focus is on the future evolution of the Copernicus EMS. He invited participants to think ahead also in view of access to "better" data (mentioning of Sentinels). Furthermore, he emphasised the Risk and Recovery Mapping service module which exists in parallel to the more prominent Rapid Mapping module, and which, despite its great potential, is so far not enough used. In this context he mentioned the Sendai framework which is particularly focusing on the preventive part of crisis management, such as risk assessments. He also mentioned the Disaster Risk Management Knowledge Centre (DRMKC[1]) which is part of the JRC Science Hub and an important platform for the dissemination of crisis related information. He also encouraged participants to increase the uptake of Copernicus EMS by spreading the word to potential new users.

In her welcome note Francoise Villette (DG GROW) underlined the important partnerships with DG-ECHO and ESA: DG ECHO in its coordinating role but also main user of the service and ESA in its role of providing the core data of the service.

(b) Introduction NEXTSPACE study

Speaker: Stephane Ourevitch (SpaceTec partners, NEXTSPACE consortium)

A study was briefly presented which is currently conducted to gather user requirements and service specifications to be fulfilled by the second generation Copernicus space component (after 2030) in the six Copernicus domains (service contract with the EC). User requirements are needed as input for planning the associated technical requirements of the future space component. These will aim to provide continuity and to address priorities in terms of temporal coverage, resolution, accuracy, delivery time, etc. The requirements collection process is supported by calls for interest, workshops, and questionnaires, creating and maintaining databases for the identification of requirements. This user workshop is one element of the requirements collection approach for Copernicus EMS and users were invited to participate in the process. Questionnaires were distributed and are available online[2].

2.2 Session 1: Current status of EMS components

The first session aimed at giving an overview on the current status of EMS components, both Early Warning and Mapping and its various modules. Presentations were given by the JRC, namely the coordinators of the individual EMS modules.

2.2.1 European Forest Fire Information System (EFFIS)

Speaker: Jesús San-Miguel-Ayanz (JRC, EFFIS coordinator)

EFFIS is one of the two Early Warning Systems in EMS. It provides fire risk assessments during the pre-fire phase and fire damage assessment in the post-fire phase at EU level and complements national fire systems. Users are EC services, the European Parliament, national/regional civil protection authorities, international organisations (FAO, UN Economic Commission for Europe). Currently, the EFFIS network involves 39 countries (Europe and neighbouring countries, countries in North Africa and the near East).

[1] drmkc.jrc.ec.europa.eu
[2] copernicus.eu/ems-workshop

EFFIS itself dates back to 1998 when the JRC started establishing the system. The system covers the full fire cycle from fire danger forecast to fire detection, burnt area mapping, land cover and erosion assessment, potential soil erosion estimates and vegetation monitoring (recovery). Since October 2015 EFFIS operates under Copernicus EMS. Towards the end of 2016, operations for (1) fire danger forecast, (2) active fire and burnt area mapping will be handed over to external service providers (upcoming calls for tender).

(1) Short and long-term fire danger forecasts, as well as monthly and seasonal fire weather forecasts were briefly presented.

(2) Active fire mapping is currently based on MODIS data, in the future it will be based on VIIRS and Sentinel-3. Using the same sensors burnt areas are mapped in near-real time (twice per day in pan-European region) at medium spatial resolution (300m). In addition, once or twice per week burnt areas are mapped from high spatial resolution data (e.g. Sentinel2, Landsat resolution). Examples for the post-fire assessment were shown on the EFFIS webpage (metadata, fire severity).

The following EFFIS modules will continue to be operated by JRC:

(3) Enhancements of other existing EFFIS modules, e.g. fire database, fire emissions and dispersion, soil erosion, vegetation regeneration, fire spread prediction for large fires, etc.

(4) Dissemination services – operation of web services & contact with countries

(5) Development of a Global Wildfire Information System (GWIS) in cooperation with GOFC Fire IT (Global Observation of Forest Cover Fire Implementation Team) and GEO (Group on Earth Observations).

In addition, future work will focus on integration with Mapping component of EMS.

Discussion:

Pavel Špulák commented that unfortunately EFFIS data cannot be directly ingested in other geographic information systems. JRC commented that EFFIS data are accessible through web services (WMS, WFS).

2.2.2 European Flood Awareness System (EFAS)

Speaker: Peter Salamon (JRC, EFAS coordinator)

EFAS is the second Early Warning System in EMS. If provides added value, trans-national flood early warning information to EC civil protection and national authorities. The EFAS idea emerged from the experiences of the Elbe and Danube floods in 2002 which revealed lack of coherent flood information and coordination for trans-national flood events. The JRC started developing EFAS in 2003. Since September 2012 EFAS operations are run under Copernicus EMS. The different products were briefly presented:

- Catchment based 10 day forecast (based on weather models),
- Flash flood specific forecasts

EFAS information is provided through www.efas.eu and Web services (WMS-T, SOS). Real-time forecasts are not publicly available and are channelled to national hydro-meteorological authorities. The EFAS partner network currently counts 50 national and regional authorities plus the Emergency Response and Coordination Centre in Brussels (ERCC). Other parties can access EFAS after agreement with the national, regional authorities in charge of flood forecasting (e.g. recently the German and Spanish Civil Protection joined the network). EFAS is open to everybody (no charges) and not limited to the European Member States.

The presentation finished with a brief introduction about on-going work which aims at linking EFAS with EMS Rapid Mapping (RM). Results of a study on the Balkan floods in 2014 were briefly presented, in which the event flood map was combined with exposure

information to assess the potential impact of the forecasted flood event. Another example showed the timeline of EFAS flood warnings and the Rapid Mapping activation for the Ebro floods in February 2015. This example aimed at demonstrating that flood alerts can have an impact on reducing the Rapid Mapping map production time (by anticipating the activation of RM following flood warnings, targeted definition of the area to be mapped, etc.).

2.2.3 Rapid Mapping

Speaker: Jan Kucera (JRC, coordinator of Rapid Mapping)

The Rapid Mapping module (RM) was presented. RM is operational since 2012 when it started as GMES Initial Operations (GIO). The transition to Copernicus was in February 2015. For authorised users (AU) it provides support on a 24/7/365 basis, post-disaster information (geospatial information as maps and vector layers) related to natural and man-made disasters within hours or a few days. The service is based on Earth Observation image data (combined with other sources) and the majority of images used for the map production come from the Copernicus Contributing Missions[3]. Sentinel-1A is used in the operations as well (dedicated S-1 ordering and delivery). The RM workflow, main actors, products and differences to the GIO phase were explained and a typical timeline with average duration of the main steps (from service activation to satellite tasking, image delivery and the final map delivery) was shown. A summary of all activations since 2012 was provided: 155 activations, almost half of them for flood events (45%), in 57% for disasters inside EU, most of them were activated by EMS Mapping authorised users (33% EC services, 1% EEAS). The modes of product dissemination were briefly explained: bulk download via SFTP and EMS portal access. The most important features of the portal are presented (AOI positioning tools, email alerts and GeoRSS feeds, overview of activations from other organisations or mechanisms, etc.)

2.2.4 Risk and Recovery Mapping

Speaker: Peter Spruyt (JRC, coordinator of Risk & Recovery Mapping)

The service was briefly presented. Risk and Recovery Mapping (RRM) provides maps and analyses in support of disaster risk reduction, preparedness and prevention, recovery and reconstruction in order to assist disaster managers in pre-disaster and post-disaster situations. The work is carried out through specific contracts with three potential consortia which were briefly presented. It was underlined that since its start in 2012 the service has been under used as there were only 15 activations in total. Examples were briefly mentioned. Most of the activations were triggered directly by EC services or indirectly by associated users. Only three different countries activated which shows lacking response from the Copernicus national focal points which are the authorised users. In order to encourage also globally located stakeholders to use the service, the Commission launched the second call for expression of interest at the beginning of March (was open until 15 April).

The procedure for service activation and related timeline including the process leading to the actual map production phase of 20 working days was explained (offer preparation, offer evaluation, contract preparation).

2.2.5 Aerial component (pilot study)

Speaker: Peter Spruyt (JRC, coordinator of the aerial pilot study)

The pilot study (2015) on the use of aerial platforms for image acquisition in EMS was presented. The study was included in the Copernicus work programme in 2015 following requests from EMS users. The study aims at testing airborne imagery as an alternative source of information to satellite images and its integration in EMS operations. Pros and

[3] For further details see section 2.4.1.

cons of aerial imagery and technical details such as acquisition modes, resolution were reported.

The specifications of the aerial component which is divided in two lots (manned, unmanned) were briefly outlined. The component can be activated by the JRC. The target delivery time of the acquired imagery is 48h.

The experience from two unmanned flights (UAV) was presented. One was conducted for mapping biomass loss, erosion and landslide risk due to a forest fire in Montan/Castellon, Spain. Flight authorization was an issue, as well as flight altitude which is usually limited. The limitation of the flight altitude had an important impact on the overall organisation of the on-site data acquisition. The second flight was conducted to support monitoring sink holes in the Acquaresi mining site in Sardinia, Italy (Risk and Recovery Mapping activation). Likewise the first case, flight authorisation was an issue. Based on these first experiences, the general need for an emergency NOTAM[4] for flight authorisation was expressed.

Results from the first manned aerial flight were also presented. The data were used to support the rapid mapping of floods and related damages in Italy (EMSR136).

2.2.6 Validation

Speaker: Marco Broglia (JRC, Mapping Validation coordinator)

The role and rationale of the EMS validation module were presented. Validation aims at evaluating products produced by RM and RRM activations on a sample basis, based on geographic/thematic distribution of activations. Validation serves to assess the quality of products and provide the rationale for service improvement and evolution.

The different modules in validation were presented: M1: Field Survey, M2: Accuracy assessment against reference data (product validation). M3: Product evaluation and impact analysis. M1 aims at collecting field data which are used in M2. In M2 the reliability of the content thematic (e.g. thematic and positional accuracy) is checked along with consistency and usability. Some examples and different validation techniques were presented, basic concepts such as omission and commission errors and confusion matrix were explained. Another example focused on usability check. Comparisons of different sensors/resolution were mentioned. M3 Product evaluation aims at finding out whether or not the products provide an added value and positively impact crisis management. Questionnaires and user feedback and tools like SWOT-analysis (strength, weaknesses, opportunities, and threats) are used to assess the outcomes. Examples from the validation reports were shown and the list of validation exercises conducted so far.

The dissemination policy of validation results was presented. The so called short reports are delivered to the members of both Copernicus User Forum and Committee. The full results (short and extensive report, geo-datasets) are distributed on a one-to-one basis to Mapping authorised users, service providers or other public or private actors who actively contributed to a validation exercise under the condition to not publish any material especially not on the web.

2.2.7 General discussion

Authorised users asked about the timeliness of RRM products: Peter Spruyt (JRC) answered, that whether or not a request for activating RRM is accepted can be given very quickly. However, the time to issue the products ranges between 2 and 2.5 months.

Ben Fletcher (COBR, UK) asked about the timeline for deploying the aerial platforms (manned and unmanned). Peter Spruyt (JRC) answered that 48 hours is a requirement (target delivery time) for the aerial component, but currently it is not yet achieved.

[4] Notice to Airman

Nevertheless, some countries do have arrangements for rapid authorisation of flights which facilitates the process.

2.3 Session 2: User experience, suggestions and views

Core of the second session were presentations from authorised users who were asked to share their experience and views on the current Mapping modules. More precisely, the speakers were invited to share their opinion about weaknesses, strengths and to provide suggestions for service improvement.

Each user presentation was followed by a presentation of a validation exercise. Presented were cases of Rapid Mapping or Risk & Recovery Mapping activations which were triggered by the presenting authorised users. It was the first time that validation exercises were presented to a wider audience and not only to the users concerned by the activation and the service providers.

2.3.1 User experience United Kingdom

Speakers: Ben Fletcher (Civil Contingencies Secretariat at the Cabinet Office, COBR Cabinet Office Briefing Room) and Andrew Richmann (UK Environment Agency)

Ben Fletcher presented the different response levels in the United Kingdom at local, regional and national scale, depending on the characteristics of the crisis (scale, intensity/challenge). He then introduced the role of the COBR (Cabinet Office Briefing Room), its strategic role in management, communication, cooperation and for legislative issues. COBR takes decisions at government's response to crisis and is the Authorised User of the EMS Mapping.

At the example of the Cumbria floods in early December 2015 (EMSR147) Andrew Richman reported on technical details (timeline from activation request, satellite image acquisitions to map release), raised some communication issues with the RM service provider (related to email contact). The products were shared with Defra and government partners. In non-urban areas (where SAR imagery was used) the flood perimeters were used by the Rural Payments Agency to determine the number of affected farm holdings and schemes in each area. They were also used in GIS for mapping during the recovery phase. In urban areas the flood vectors were used - along with oblique aerial photography, social media and ground survey data – for planning relief operations.

The second example was the flood in winter 2013/2014 in South England for which the UK had activated both the International Charter Space & Major Disasters and the Copernicus EMS (EMSR069), as both were available. Additionally, airborne LIDAR imagery was also used. The complementarity of LIDAR data for urban areas and space borne SAR imagery in non-urban areas was particularly appreciated. The satellite data was used to update the hydrological models. Aerial imagery was made available for the validation exercise (see next presentation). The results from the validation exercise reinforced the experiences with Copernicus EMS. Appreciated was the wide area coverage and accessibility of products on the website. It also raised awareness on the risk of underestimating the flood extent and on the inherent limitations of the SAR analysis which may lead to lower thematic accuracy in urban and forested areas.

Suggestions for improvement:

- Besides vector data and maps, provision of baseline satellite data would be very useful as additional analysis can be carried out by the user
- It would be useful to be informed about satellite image acquisition schedules as this would allow briefing colleagues and being aware of the expected map delivery time.
- Suggest not to deliver FAM (First Available Map provided 3h after the image delivery) if not specifically requested. Given its preliminary nature the map content can be imprecise or even misleading.

- Timeliness and monitoring frequency could be improved. Consider that information is needed as up-to-date as possible as this allows understanding what will happen next. Consider also that involved actors meet at high frequency (example COBR). Accordingly, earth observation based information should be made available faster and at higher frequency (e.g. daily monitoring).
- Printed maps are useful, both for ministerial briefings and Environment Agency crisis response contexts. A3 format would be useful.
- Raise awareness of Copernicus:
    - Make sure that local emergency services know about Copernicus and the International Space Charter
    - To some extent EMS website is not particularly friendly to non-remote sensing experts. It could be clearer in pointing users to the appropriate product of the activation.
    - Within the UK, communication between centre and local areas needs to be improved.
- Separate Authorised User from End User contact point on activation as this can lead to questions being directed to the wrong user.
    - Consider here that the person authorising the request (UK authorised user) is not necessarily the best suited for discussions on technical aspects (GIS).
    - Related to this, post-authorisation conversations should be with GIS specialists. The question is how this can be ensured?
- Consider improving coordination between the International Charter and Copernicus

2.3.2 Validation of Rapid Mapping activation for Floods

Speaker: Massimiliano Rossi (JRC, member of the EMS Validation team)

At this user workshop the occasion was used to present actual validation exercises. Related to one of the RM activations presented in the UK user experience presentation, the validation of the maps produced for the South England floods in 2014 was presented. For this the UK Environment Agency provided aerial images, vertical and oblique, as reference data. The activation was rather huge releasing overall 35 maps (among them 22 flood delineation maps). For the map production only radar imagery was used. The authorised user activated in parallel the International Charter. Maps produced by the Charter were compared with those produced by EMS RM.

Insights to the actual validation exercise were provided through visual examples for the thematic validation and accuracy measure computation. Main results from the analysis of strengths and weaknesses were presented. One main issue was the inaccuracy of the first rapidly delivered maps (FAM) which resulted in some loss of confidence in RM products. The accuracy assessment highlighted also the limitations of SAR data in urban areas due to multiple scattering. Opportunities and recommendations resulting from this validation exercise were presented.

Discussion:

From their experience Mr Gylfason (Iceland) reported that the procedure for defining an activation is complex and off-putting. The dialogue with the RM service provider was not easy. Volcanic eruptions were indicated as possible extension of the portfolio.

The RM service provider commented that some steps in the production cannot be compressed (referring to the Cumbria flood), but that further monitoring could be speeded up if requested in advance. Even daily monitoring might be possible if communicated in advance (e.g. after first maps were produced).

2.3.3 User experience Spain

Speaker: Angela Iglesias (Dirección General de Protección Civil y Emergencias)

The Spanish civil protection system was presented with planning tools for generic and specific risks, and the different levels of response (national, regional and local government levels). Furthermore, the data sources offered by different national (for earthquakes, volcanoes, landslides, floods, tsunamis, forest fires), regional hydrological authorities, and international systems (EFAS, EFFIS) were presented.

In 2015, Spain activated Copernicus Rapid Mapping seven times: twice for flood events, once for a flash flood, twice for fires and once for an earthquake. Furthermore, once the Risk and Recovery Mapping was successfully activated. There were three unsuccessful activations in 2015.

Rapid Mapping activations for floods EMSR118 and EMSR120

Both activations were for floods occurring in the Ebro river in early 2015: the first activation (EMSR118) was initiated by the Hydrographic Confederation water authority (HC) and EMSR products were also used by the civil protection service in Aragon, the Aragon's Foundation for the development of Earth observation (FADOT) and the general directorate of civil protection and emergencies. The second Ebro activation (EMSR120) was not activated by the HC given that the resolution of the data used in the first activation proved not adequate for the definition of compensation payments which was the end use of the products. Except for HC the end users of EMSR120 products were the same as in the first activation but products could not be integrated in operational workflows (see weaknesses below).

Overall, the results of both activations were good and useful. It was also acknowledged that Copernicus EMS used the best available data considering the extent of the area to be mapped.

As weaknesses were mentioned:

- The spatial resolution in both activations was lower than needed for management operations.
- The flooded areas delineation in EMSR118 did not match with field observations. Radar technology shows clear limits in densely vegetated and urban areas. The use of optical data (NIR band) resulted in more accurate flood delineation.
- For EMSR118 the lack of relevant information to understand the products was mentioned (metadata, standard readme file to help visualisation and understanding of the information presented in the products).
- Products of EMSR120 did not characterize the maximum flooding extent, as the acquisition time of the satellite images was far from the flood peak (time provided but not taken into consideration).
- The provision of very different crisis information vector layers in one of the EMSR118 products (Detail 03) was rather confusing.

Strengths:

- The employment of radar images, like Sentinel-1A data, has improved the service in terms of flood mapping
- In EMSR120 it was easy to understand which are the flooded areas and the flood evolution.
- The quick delivery of products was a major benefit. The products' timeliness allowed the management of the emergency and take decisions with the information received.

Suggestions:

- The service and the applicability of the products in emergency contexts would benefit from a more fluid communication between end users and Copernicus EMS RM.

- Moreover, coordination between the different actors involved, with respect to available cartographic information and data acquisition schedule, would result in more reliable and usable products
- a combination of data could be used in future activations to minimise the limitations of radar data

Mapping activation for forest fire in Montan, summer 2015

The change of the initial request from a Risk & Recovery Mapping to a Rapid Mapping service activation (EMSR131) surprised the user. In addition, a UAV flight was offered (in the frame of the pilot study on aerial imagery) and as a consequence regulations had to be checked first.

Overall, it was reported that EMS mapping has a good impact on the user workflow but it is still weak and the service could be improved. The following weaknesses, strengths and suggestions for improvement were mentioned.

Weaknesses:

- The format of the products was perceived not to be the most effective and the users wish more varying delivery formats (raster, vector). In order to use the images and products in further studies and assessment, it would have been really useful to load the individual layers (delineation, grading, hi-resolution colour satellite image, etc.) in a GIS software, as TIFF files for example, instead of having them in a pdf file. Even the individual satellite bands with metadata and radiometric information (wavelength range, etc.) would be very useful.
- The communication about the results of the UAV flight was not very good or clear.
- At the example of the Montan fire activation the challenge of managing the flow of incoming emails was mentioned.
- Lack of high/very high spatial resolution satellite images at the crucial moments of the emergency (flood, fire peak) may make the delineation of the maximum damage extent very difficult.
- Delivery of delineation products with spatial resolution lower than needed/requested, limits their operational use.

Strengths:

- The products were served quite quickly (appropriate time frame)
- Good quality product (delineation)
- Very interesting the offer for a UAV flight
- During the activation phase the communication with the service provider was very good.
- The quality of the PDF maps is good.
- Good accessibility of products (through SFTP and/or Copernicus EMS Portal, performance of access platforms, organisation of deliverables)

Suggestions:

- In the activation phase the user would wish that the service provider is more proactive.
- When defining the AOI or scale, the simulations, forecasts or data sent by the user should be strongly taken into account in order to get the most appropriate image near the peak of the emergency.
- It would be useful to know the time of the product acquisition in advance. This would increase efficiency.
- Consider including other products and information sources which are more relevant (follow the suggestions from the user).
- Provision of so many products in different formats and resolutions may hinder their use in the emergency management, when time efficiency is critical, and slow down the emergency management work => Maybe only maximum resolution should be provided in a first phase.

- Receive the original satellite data along with the products.
- Receive the hi-res colour satellite image, individual delineation and grading rasters, and also individual satellite bands with metadata and radiometric information (wavelength ranges, etc.)
- Get files with information about the reliability of the crisis information.
- The moment of satellite acquisition should be as closest as possible to the peak of the emergency.
- Know the products that can be expected and the needs of different types of End Users (avoiding misunderstandings on the type of products that can be delivered.)
- Have the sensor footprint outlined, thus indicating more clearly the lack of the crisis information wherever the image does not cover the AOI.
- Have an interactive map; both multi-layer or multi-frame, could be added to official Copernicus-EMS products, in order to monitor events such as floods.
- Monitor the event on a daily basis when relevant (using the monitoring option of the Rapid Mapping).

Discussion:

The Stefan Voigt (RM service provider) commented on the difficulties with the dialogue between users and service providers for defining AOIs that may be here today and there tomorrow. Domenico Grandoni (RM service provider) furthermore suggested that both high and low resolution data can be used in spatially dynamic events.

2.3.4 Validation of Rapid Mapping activation for Fires

Speaker: Uxue Donezar Hoyos (service provider of EMS Validation, Trabajos Catastrales S.A.)

First results from a currently on-going validation exercise were presented (EMSV015). The exercise evaluates RM activation for forest fires in Spain (Montan, EMSR131) for which fire delineation and grading maps were produced.

The activation applied originally Pleiades imagery. Landsat and Sentinel-2 data were used to validate the RM maps including UAV data which was acquired by the aerial component (see 2.2.5). In addition, RM damage classes were intersected with land use/cover classes, compared with MODIS based fire delineation from EFFIS. The overall accuracy was found to be very high for most products, apart for MODIS based products. The positional accuracy was found to be in line with the specifications. RGB and NIR UAV data was checked, their co-registration problems were confirmed. The applicability of S2 was found to be very good and would have been a good alternative to the actually used very high resolution data (Pleiades). The UAV data could not be ingested in the image processing workflows. Questionnaires for validation were created (on-going at the time of the workshop).

Discussion:

Angela Iglesias (DGPCE ES) raised again the issue of raw image data availability. For this topic see details in section 2.4.1.

The Stefan Voigt (RM service provider) recalled the issue of AOI definition in case of dynamic targets (fires, floods). He emphasized that a detailed, well defined AOI is necessary but that the service provider is always open to discuss in order to find a solution.

Angela Iglesias (DGPCE ES), replied about RRM service awareness campaigns in Spain (Peter Spruyt's question, JRC), and stated that there is good communication with the municipalities and that her organisation is doing its best to spread the word.

2.3.5 Risk and Recovery Mapping activations in Portugal

Speaker: Christof Weissteiner (JRC, member of the Risk & Recovery Mapping team)

Since the invited user Giuseppe Cornaglia was not able to attend the workshop, the three Portuguese RRM activations were presented by JRC.

The first RRM activation EMSN017 dealt with delineation and mapping of the 10 largest forest fires in Portugal in 2015. Maps related to damage delineation and grading, biodiversity loss assessment, landslide/erosion risk, and mitigation measures were created. SP in charge was INDRA/Spain.

EMSN018, multiple risks on Azores islands, and EMSN020, regarding multiple risks on Madeira Islands were executed by the SP GEOAPIKONISIS. Scope and example products were presented. For Azores, seismic risk, flash flood, landslide/erosion, lava flow and coastal erosion risk were mapped, moreover mitigation measures proposed. For Madeira, Tsunami risk, flash flood, landslide/erosion, forest fire, industrial accident risk were mapped, including mitigation measures. The Azores and Madeira activations were of huge extent (2,500 and 500 map tiles).

It was demonstrated that the foreseen timeliness of 20 working days for product generation were exceeded in all cases, in some cases considerably. Most often, the delivery delay was due to late satellite imagery deliveries.

The Portuguese feedback was generally very positive, in particular regarding the completeness and the biodiversity loss assessment. For the Portuguese forest fire, however, a 300 ha discrepancy was reported in one AOI, and the product delivery delay did not allow the activating country to distribute available funds in 2015, as this product was envisaged for. For Azores, the feedback was very positive, for Madeira feedback was not yet available.

Users were generally encouraged to activate RRM if the conditions apply.

A user comment addressed a concern regarding admissibility or justification of the activation and in particular its costs. Peter Spruyt (JRC) explained that each activation requires approval from the ECHO-ERCC, and that activations can be approved if compliant to a set of criteria and upon availability of funds. For the particular case of the huge Azores/Madeira activation it was added that the products had a very good cost/benefit ratio.

2.3.6 User experience Italy

Speaker: Roberta Onori (Dipartimento Nazionale della Protezione Civile DPC, Italy)

The role and integration of products, which are based on the integration of traditional and innovative EO and ground-based (non-EO) data and technologies, for Civil Protection Authorities involved in risk management activities was explained. EO data and derivative products are provided to the DPC in three main ways:

- Collaboration at national level between the Italian Space Agency (ASI) and commercial companies (CC) for EO data and services (latter are “value adding providers” for hydrological and geological risk). During an emergency, ASI acts as a data provider and is activated by DPC, in agreement with the Regional Authorities, when an event occurs and there is a need for monitoring the evolution of the phenomena, or for an improved understanding of the possible impact of the event on the built environment and the population. DPC, ASI and the CCs act together as “program manager” in close cooperation with the Regional Authorities.
- At European level the Copernicus Emergency Management Service (EMS) is exploited (DPC being the Authorised User).
- EUMETSAT and NOAA provide satellite data used for the evaluation of meteorological and hydrological parameters.

The use of EO data usefulness is well recognised by the Civil Protection authorities which is a result of more than ten years of experience in this domain. Operational use of EO data captured by different satellite platforms represents a valid support in the planning and monitoring phases, and for the management of emergency and post-emergency situations. ASI has been promoting several projects on this topic in the past.

Italy has been using EMS actively in the past with one activation of RRM (for an international civil protection exercise) and 20 Rapid Mapping activations (12% of all RM activations; for forest fires, floods, earthquakes and other events).

The experience with Rapid Mapping was presented per risk/event type. For Italy, floods and landslides cover most activations of the national Civil Protection system. The following feedback was given on activations related to various disaster events:

- Floods: EMSR108 and EMSR112 were highlighted (Lombardia and Liguria regions). Optical and radar imagery were applied in these activations; different radar sensors (COSMO-SkyMed, Sentinel 1-A) were used for monitoring flood events at river basin scale. For flood, EMS is considered a valuable service. The main reason for activating EMS was to have access to optical data.
- Landslides, flash floods: The quality of received products depends on the type of landslide, RM delivers sometimes good, sometimes bad results. The use of satellite EO data in the mapping of flash flooding in small Mediterranean drainage basins (e.g. in Liguria) presents significant challenges also for the planning of image acquisitions (water only remains locally, weather conditions). Aerial data acquired for mapping landslides in Emilia Romagna in 2015 (EMSR138) proved to be very useful, reducing acquisition time and offering more flexibility.
- Seismic risk: feedback on EMSR004 (Earthquake in Emilia Romagna region) and EMSR125 (Nepal Earthquake) was presented. Even though EMSR125 was not requested by Italy, the results were used (presence of a camp of the Italian Red Cross in one of the mapped areas). Overall, it was suggested to improve the multi risk mapping and to combine data from different sensors (including thermal).
- Volcanic eruption: EMSR148 (Etna eruption) was presented. Here opposite to knowledge on the ground, no ash fall was detected from the satellite imagery. It was accordingly suggested to improve the method applied to detect ash fall. Same as for seismic risk, it was suggested to integrate data from different sensors (including thermal).
- Other events: activation supporting the management of the Costa Concordia cruise ship transport across the sea (an emergency lead by the head of DPC, July 2012) and the bacterium *Xylella fastidiosa*, harming olive trees in southern Italy (2015). For activations of this type it was suggested to facilitate access to the service.

Lessons learnt:

- Good Integration of services and products resulting from the National System and European Copernicus EMS
- Close collaboration between the Service Provider and User
- Close collaboration between Users at National, Regional and Local level
- Good integration in internal geographical information system (Sit DPC), FloodCAT platform (EU Directive) and DEWETRA platform (Early Warning System and monitoring tool)

Suggestions for improvement:

- Integrate space-based data with different data sources (aerial data) for the optimization of the product performances in terms of: accuracy, spatial and temporal resolution
- Improve the multi-risk mapping (floods, earthquakes, volcanic eruptions, landslides, etc.) including specific competences for each risk
- Increase the validation activities
- Provide EMS products also as WMS/WFS web services (OGC compliant)

- Provide satellite data (level 1 orthorectified)

2.3.7 Validation of Rapid Mapping activation for land slides

Speaker: Jonathan Spinoni (JRC, member of the EMS Validation team)

The results of one of the first validation exercises in the lifetime of EMS were presented (EMSV002). Validated was the Rapid Mapping activation for Landslides in Emilia Romagna (EMSR037). In this validation exercise all three modules were applied.

In Module 1 positional and thematic control points, geo-tagged photos were collected. These were used for M2 and to compare the different devices. Module 2 focused on thematic validation using different input data (satellite images, UAV data, cartographic and non-cartographic other material, photos). New methods were not tested. Thematic validation was performed through the creation of reference data and reprocessing checked thematic consistency, geometric accuracy, and the accuracy of devices used in M1. Under Module 3 two interviews (with the authorised and the end users) were conducted providing a plethora of information and many suggestions, strengths and weaknesses.

The detection of landslides was effective, as was the amount and quality of the collected field and UAV data. Negative results reported were the distortion of satellite imagery, the too low resolution of the images used (commission errors), and the map accuracy which was lower than declared on the map. Users suggested providing also the not-interpreted image as a product, and a fast first delineation map. The technical user of the products was not very satisfied with the products.

The validation service provider Tracasa commented that in general Validation highlights that, even though improvements should be made, the short production time in Rapid Mapping generally leads to good results.

2.3.8 User experience Emergency Response and Coordination Centre

Speaker: Ana-Maria DUȚĂ (DG ECHO-ERCC, EMS Authorised User and coordinator of service activations)

Brief introduction to the ERCC, its role and tools:

- Coordination hub of the Union Civil Protection Mechanism;
- 24/7 monitoring, collection and analysis of real-time information on disasters with the support of the Joint Research Centre;
- Quick response to disasters both inside and outside Europe;
- Support to the disaster response efforts together with Participating States;
- Deployment of EUCP Teams in disaster stricken countries;
- Entry point for Copernicus EMS requests (both Rapid and Risk & Recovery Mapping)

Besides being entry point for EMS activation requests, the ERCC is also an authorised user. Satellite based maps are used for 1) Situation awareness and analysis, 2) the EUCP Team deployment and 3) to support financial decisions.

How ERCC uses EMS Rapid Mapping products was showcased at the examples of the floods in Myanmar in August-September 2015 (EMSR130) and the earthquake in Nepal in April 2015 (EMSR125). In case of Myanmar the flood extent layers were used to monitor during one month the flood evolution in the Irrawaddy delta. For Nepal the ERCC activated the EMS Rapid Mapping four hours after the event. The produced maps were used to assist the national authorities, provide an overview on the situation in the first hours and days after the event, assess damages and needs, support the EUCP Team deployed in the field, support funding decisions. In particular, maps helped mapping blocked roads in rural areas which helped local authorities prioritizing and planning road

unblocking operations. Furthermore, EMS information was used in overall situation assessments (e.g. ECHO Daily Map).

2.4 Session 3: Data access, availability and service evolution

Session three was split in two parts. The first part addressed current access and availability to data used or produced by EMS Mapping. Presenting were ESA as the entity providing access to the imagery, the core data of EMS Mapping, and the EEA as the entity delegated to organise access to reference and in-situ data. Latter are supporting information extraction from imagery and map production (for example administrative units, hydrological-, transport network, buildings, land cover/use, locations, elevation). The session also provided some vision on the future access to the information produced by the service.

The second part of this session was dedicated to the discussion on the evolution of EMS Mapping.

2.4.1 Earth Observation data acquisition and access

Speakers: Fabrizia Cattaneo (EMS account manager at ESA), Lena Stern (Mission Management Officer at ESA)

Scope of this presentation by ESA was to introduce users to the framework and related conditions of access to Earth observation data in the frame of Copernicus and in particular in the frame of the EMS.

Data provision in the frame of Copernicus is managed by ESA who is in charge of coordinating the overall Copernicus Space Component as well as operating most Sentinel satellites. Copernicus Services are the main users of the Space Component data. ESA is also the development and procurement agency for dedicated space infrastructure. Copernicus Space Component (CSC) provides the frame for organising the procurement of data from the so-called Contributing Missions (CCMEs, commercial image providers), which constitute the majority of data used in EMS Mapping. Conditions for access and available datasets itself are described in the Data Access Portfolio (DAP). The data offer is the split in three categories:

1. core datasets,
2. additional datasets,
3. data from the Sentinel missions.

A prerequisite to become a user of CCM data is registration, including the signature of the CSC-DA user license (https://spacedata.copernicus.eu/web/cscda/data-offer/terms-and-conditions) (Copernicus Space Component - Data Access). The CSC-DA user licence and related conditions, including user categories and related access rights, were described. In general, EMS authorised users fall under user category 5 "public authorities" who, after signing the licence agreement, have the right to use, copy, publish (with constraints) data but are not allowed to redistribute the data (only within the project). Amendments to the licence required by the individual data providers (e.g. for Pleiades) are specified in the mission (CCME) specific annex document to the licence agreement. Sentinels are the least restrictive granting rights to use, copy, and publish but not re-distribute the data. EMS authorised users were invited to register and sign the CSC-DA licence in order to access data acquire for EMS activations.

The different core and additional datasets were explained (sensors, missions) as well as the different tasking and delivery schemes for additional datasets (timeliness). Furthermore, the registration process, mechanisms for submitting data requests and interfaces for accessing data (Eoli-SA) were presented.

The REACT mechanism (Rapid Emergency Activation for Copernicus), through which data are provided for Rapid Mapping, was presented.

The use of Sentinel for EMS was strongly encouraged; it was also argued how Sentinels data were already successfully used both within Rapid Mapping, Validation services and other applications.

The data access brochure was distributed to participants.

Discussion:

Andrew Richman (EA UK) asked if national public authorities can have access to new rush (2-5 hh). *Answer ESA:* The answer was no, it is necessary to pass through the Copernicus EMS.

Can we task Sentinel-1? *Answer ESA:* No, it relies on a predefined observation scenario but specific requests for security, background imagery etc. are encouraged.

Pavel ŠPULÁK (CZ) commented about access to digital data as WMS and related security issues (possibility to download).

Jan Kucera (JRC): Could we provide access to the imagery acquired for EMS activations through SFTP? *Answer ESA:* Yes, but only if the licence is signed (otherwise, redistribution is not allowed). How long does the process of licencing take? R: Around 2 days. The licence signature is online. Cascade mechanism is possible, but licencing is obligatory also to know how many users there are.

Francoise Villette (DG GROW): What are the exploitation scenarios for Sentinel? Delivery of the data depends on the resolution as well, and revisiting.

Unknown speaker: Are the new Sentinel 2 images available? REACT is also available for Sentinel? *Answer ESA:* REACT follows a special procedure for Sentinel data, currently only for Sentinel-1. A procedure for Sentinel-2 is not in place yet considering also that it has not been used in EMS yet. The delivery of Sentinel depends on the resolution. Sentinel1 is not VHR1 but has a good revisit time, is free and has a weekly revisit in many areas. The dissemination of images could also be rush or 24 hours in the scientific hub.

Domenico Grandoni (RM service provider): we are very far from that target of new rush, WMS is not easy to access as RGB, Sentinel-1 is still partially operational, Sentinel-2 data as archived data, operationally speaking is still not possible to use for emergency response.

2.4.2 CORDA – Reference data access for Copernicus services

Speaker: Henrik Steen Andersen (European Environment Agency EEA, coordinator of CORDA)

Access to geospatial reference data is critical for EMS. By definition of Copernicus regulation geospatial reference data is all what is not spaceborne: in-situ, orthophotos, transport network, etc. In principle access to reference data is thought to be a contribution by the Member States (MS).

The EEA is supporting Copernicus services by setting up the Copernicus Reference Data Access (CORDA), i.e. by providing a single access node for Copernicus services and links to relevant authoritative geospatial reference data. The role of the EEA is to coordinate data providers and ensure data provision. Over 20 reference datasets are reported as critical, among them ortho-images, administrative units, transport network, LULC, buildings, DEM, etc. Main challenges are: diversity of data, ownership by national and regional authorities, volume and heterogeneity (scale, quality, coverage), data restrictions. EEA's role is to work on behalf of services with the MS and regional authorities (e.g. Eurogeographics).

CORDA is operational since October 2015, hosted and maintained by the EEA, tailored to the need of Copernicus Land and Emergency Management services. It does neither offer

cross border harmonization at European scale, nor creation of derived products. It simply provides centralized access to MS datasets. CORDA will only be a success if data is available. More and more data is expected in several areas. It is important for this process to know if it is providing the correct data at member state level and service provider level.

Discussion:

Stefan Voigt (RM service provider) commented: cadastral agencies from 32 countries were exclusively grouped for the Emergency Management Service, but what about the data access? CORDA is fine, but it is difficult to download and get access to data. *Answer EEA:* EEA need to renew the agreement they had some years ago and/or discuss with new authorities about mapping if something more efficient could be achieved as including also Eurogeographics. EEA want to check if this service is available at service provider and national authorities' level and constantly reacting if the system is not working. EEA also want to add INSPIRE catalogues and related useful datasets.

Domenico Grandoni (RM service provider): mentions that he is a CORDA enthusiast since 2014 but not sure that its current form is useful for using it in Rapid Mapping activations. Data require harmonization but even ETL (Extract, Load, Transform) processes are complicated as it presumes a very detailed understanding of data structures. Rapid Mapping production modes require cached data, ready to be used in personalized formats, readily usable and available. Interesting instead is the offline availability. An ideal setting for Rapid Mapping would be having the possibility to drag a given AOI and get all data from national authorities having quickly access to updated ortho imagery, administrative boundaries, transport network, etc. These requirements should be captured.

2.4.3 Product access and dissemination

Speaker: Jan Kucera (JRC Rapid Mapping coordinator)

The current EMS RM Mapping product dissemination was presented. They include dissemination of raster and vector formats via sftp (allowing bulk download) and via portal (allowing search, filtering and pick up of single products). To enhance the product accessibility also via interactive map interphase, the Geonode (geographic content management system) as possible future scenario for product discovery, viewing and downloading was presented. Links to crisis layers provide access to view services and web feature services -WFS (an example was the forest fire in Spain, Montan activation). Challenges for maintenance and automatic upload of EMS RM layers were also clarified: EMS RM standardised formats, naming conventions and metadata allows full automation of product uploads and database maintenance routines into Geonode.

Possible ways to disseminate satellite imagery for disaster management were also discussed. A matrix with dissemination methods with corresponding user needs and required capacity, number of users (audience), and level of freedom to process the images was presented. For example, if the user is downloading the images for further processing, he needs fast internet, big storage, image processing software and skills. The number of users with such capacity and the freedom to process images the way they need is relatively small. The full matrix included in the presentation is shown in Table 1.

Table 1. Image dissemination methods and corresponding user capacity, number of users and level of processing freedom.

Imagery Dissemination Method	Required capacity and resources of the user	Number of users (audience)	Level of freedom to process image
Download (from ftps, EoLiSa, USGS EE, SciHub….)	Fast Internet, Storage, Software, Fast computer, Skills, Data Organisation	Small	Unlimited
Webservices (WMS, WTMS…)	Fast Internet, Software, Good computer, Skills…	Small-Medium	Medium
Web interactive map (HTTP Links)	Slow Internet, "Supermarket computer", Mobile phone, Internet Browser	Large	Limited (to zoom, setting transparency etc.)

Several examples of MODIS daily monitoring from the NASA server such as oil spills, Montan forest fires, Nepal earthquake via http links (and potentially large number of users) were presented. Examples of other interactive maps (via http links) included forest fires close to Valencia (EMSR131), Etna Eruption (EMSR148) and smoke over an Iraqi refinery. The reason to focus on lightweight web interactive maps is that they allow users without special image processing skills and capacities to preview the image in full resolution even with very limited IT equipment.

Discussion:

Stefan Voigt (RM service provider) expressed general appreciation for the presentation and applications shown. He underlined that Copernicus is the EU capacity for monitoring global crisis and global imagery. How can we manage data from ESA and also buy data from third parties? We see NASA, but we should focus on EU, not looking for technologies from non-European countries. *Answer Jan Kucera (JRC):* The technology is already here, we just have to implement it.

Lena Stern (ESA): coming back on the topic of data access she underlined that ESA cannot prevent criminal attempts of downloading data and that sharing images through WMS is a viable and legally acceptable solution.

Jan Kucera (JRC): This new scenario declared from ESA of sharing data through view services is really promising, and will be further investigated. In any case, we aim at making the access to EMS data easier than it is now.

Stefan Voigt (RM service provider): we ask the authorised users to consider if they prefer having the imagery or they might prefer having online tools for analysing the extracted crisis information layers.

2.4.4 Cooperation with the International Charter on Space and Major Disasters

Speaker: Francoise Villette (Copernicus EMS project coordinator at DG GROW)

Main positive aspects involved in the cooperation between EMS and the International Charter on Space and Major Disasters (IC) were evoked. These include room for synergies. As the services provided are different, duplication is not an issue. Furthermore, cooperation opens up interesting scenarios without stepping in each other's house. A forthcoming IC symposium in Bonn was announced.

Discussion:

Stefan Voigt (RM service provider): Within the IC imagery can be used only for ten days after the emergency (licence issues). This is a huge difference to Copernicus EMS but there are others: response is done with no standards without service level declarations (best efforts basis), main audience is civil protection agencies (targeting national disasters) but it is not in the humanitarian domain.

Lena Stern (ESA): ESA would like to understand how the cooperation between IC and EMS is working in practice, and expressed an interest to follow this up. Philippe Bally (IC responsible at ESA) unfortunately could not attend but asked Lena to express that ESA is in favour of having this discussion.

2.4.5 Evolution of EMS Mapping

The scope of this session was to discuss on the current service and its future evolution. After four years of operations the service is mature and needs to explore possible directions for evolving and to include the latest advancement in the field. The timeline of the current service framework contracts was briefly presented: those for Risk & Recovery Mapping and Rapid Mapping end in February 2019, the one for Validation in January 2020. New framework contracts will be drafted and tendered in 2018 for the two main mapping modules.

The EC is systematically collecting feedback and the outcome of the user workshop is one important source of information for addressing service evolution. Other important sources are the outputs from the Validation module, feedback received through user feedback forms (collected for each activation), service internal feedback (by EC and service providers), and the Copernicus Committee and User Forums. Suggestions for improvement will be addressed as far as their implementation is feasible under the current contracts and if not these will be taken to the next phase of service framework contracts.

The discussion during this session was initiated by an overview on the comments captured during the previous sessions and the input received in the frame of a dedicated online survey which was launched before the workshop[5] (for survey see Annex Figure 1). The question which was not specifically asked again during the workshop is briefly summarised in the following paragraph. The summary of the results for the other questions together with the comments received during the workshop follows after it.

In the survey users were asked among others to tell whether or not they have activated any of the two Mapping modules, and if not, it was asked to provide reasons. Table 2 below shows the results for this question. While most of those answering the survey (15) have already used RM, only four ever used RRM. These four have also used RM before. Two out of the users who never used RM did not need the service whereas one did not need it due to lacking opportunities (absence of disasters). More than half of those who have never used RRM before answered that they did not need it, two did not know about it. From the reasons provided under "Other" it can be concluded that there was either no need for using the service (2 answers) or the user was not sure about what it can provide (1 answer).

The result for RRM is in line with its observed under usage: since April 2012, there were 20 RRM activations compared to 155 RM activations.

[5] Two weeks before the actual workshop all EMS Mapping National Focal Points and registered users (in case these were different from the focal point) were invited to give feedback on both service modules Rapid Mapping (RM) and Risk & Recovery Mapping (RRM). Overall, 15 answers were received out of a total of 32 Copernicus participating countries plus EEAS and EC services (among them DG ECHO as the main user).

Table 2. Results of the pre-workshop online survey, question on the usage of both Mapping modules.

Service used before	Reasons for not having used it	Rapid Mapping (RM)	Risk & Recovery Mapping (RRM)
Yes		11	4
No	I didn't need the service	2	6
	I didn't know about the service	1	2
	Other	1	3
Total		15	15

Comments from the workshop itself are summarised hereafter together with the other results from the survey. All comments were grouped in strengths, weaknesses and suggestions for improvement. To further ease summarising these comments they were classified in the categories defined in Table 3. As opinions about strengths and weaknesses were diverging for some issues, they are confronted in Table 4. Related suggestions for improvement are indicated whenever relevant.

Out of all suggestions for service improvement, users labelled the following as top priorities (unless indicated, suggestions apply equally to all Mapping modules):

1. Quality of the service and products
2. Accuracy of the information provided
3. Usage/availability of higher resolution images
4. Real time support from experts
5. Improvement of the product portfolio:
    a. For Risk & Recovery Mapping some users would like to see (i) specific products for each risk (tailoring of products) and (ii) a wider range of use
    b. For Rapid Mapping some users would like to see an improvement in the multi-risk mapping (consider using other methods) with more technical products for some risks like (e.g. landslides, volcanic risk, heat maps for damage assessment). Specific competences should be considered for achieving this (e.g. ash and gas distribution monitoring, lava flow modelling).
6. Improvement of the timeliness:
    a. For Risk & Recovery Mapping in terms of activation acceptance and start of the production phase.
    b. For Rapid Mapping it remains a priority which should be improved aiming at faster delivery.
7. Improvement of the validation phase for the products
8. Provision of regular status updates to the user (on activation acceptance, expected image acquisition time, expected delivery time, etc.)
9. Provision of the imagery used for the information extraction
10. Dissemination of products and ideally also imagery through web services
11. Integration of data from different sources (including thermal data, aerial data)
12. Awareness raising of the service:
    a. Inform local emergency services (to be followed also by authorised users themselves)
    b. Improve the website (more user friendly)
    c. Improve communication between national and local actors
    d. Elaborate on and publish "success stories"
    e. Inform better what/how the products will be used

Table 3. Categories for issues summarised in Table 4: category name and description.

Issue category	Description
EMS framework	The foundations of the EMS mapping services: procedures, contractual, dependencies
Service specifications	Scope of the service, event types covered, product types, main content, delivery time, output types & formats (product portfolio)
Service dependencies	Other mechanisms on which EMS depends, e.g. data provision through ESA DWH
Information about the Service Portfolio	Information about the service through documentation (user guide, manual of operational procedures), EMS web portal, trainings and workshops
Dialogue with the service	Communication during an activation between the authorised user, ERCC, the service provider, and the JRC (e.g. concerning details of the service request, information about the activation status and production phase)
Dissemination	Product dissemination mode, i.e. for maps, data to users & the public (access through the SFTP, the EMS portal, web services)
Product quality, accuracy	Product characteristics (quality - consistency with specifications, internal consistency, thematic & positional accuracy, reliability, usability in users workflow)
Impact on user workflow	Impact of the service on user workflows, product usability in operational workflows, feedback on how products were used
Synergies with other activities	International Charter; provision of data acquired, owned and maintained by users (UAVs, aerial)

Table 4. Summary of user comments. When relevant, comments on the same issue are confronted, related suggestions for service improvement are listed.

Issue category	Strengths	Weaknesses	Suggestions for improvement
Mapping general			
EMS framework	- Service is free of charge	- Limited budget	
Dialogue with the service	- RSS feed is important for us to see if ERCC or us placed images there		
Service dependencies	-		- Provide the original satellite data along with the products
Risk and Recovery Mapping			
Service specifications	- Applicable worldwide		
	- Multi-hazards - Multi-risk assessment	- Products portfolio - Range of use	- Improve the products portfolio with specific products for each risk (tailoring of products) - Allow wider range of use
	- Scope to support the planning and recovery actions - Can be used for monitoring purposes		
		- It would be helpful to have parameters that are relevant for decisions (e.g. it is interesting but not useful to know if the degradation risk is high-medium-low or information about NDVI. Rather, a statement like "here we found a loss of xy kg/km biomass" -> this would definitely be more sophisticated / challenging but an expansion of the RRM in this regard would be very welcome)	
		- Partly quite long duration of the processing (production)	
Information about the service portfolio		- Unsure of what it can provide, early activation or activation preparation would be useful - Better information sharing about the possible opportunities - I don't have the time to explore the RRM especially when there is no disaster or emergency	- Elaborate on and publish "success stories" (what was the demand of the user, what was the initial situation, which management / political decisions could be supported by the deliverables -> concise examples rather than general statements like in the information brochures would be very welcome)
Dialogue with the service		- Timeliness to know about the activation acceptance - Weak communication about the status of the activation was experienced - There is no discussion between AU and SP which prevents understanding for what he needs the	

Issue category	Strengths	Weaknesses	Suggestions for improvement
		products and thus avoids tailoring better to actual needs	
Product quality, accuracy	- Quality of the results is high, was very much appreciated by the user		
Rapid Mapping			
Service specifications	- FAM are very relevant - A quick result with low quality is better than no information at all. - appreciate the flexibility of the service (fast maps, not accurate, later on accurate maps) - yes to FAM: very relevant for flash floods (gone in 8 hours)	- Distributing maps with errors is a weakness (FAM), we prefer to wait a bit more for more accurate maps	
	- The variety of formats provided - Printed maps are useful for briefings - Sometimes static maps are needed but in most cases polygons are always useful as well as the raw data (imagery) to do further analyses or to integrate in GIS	- Formats are not the most effective	- Ensure EMS will continue to have varying delivery formats (raster, vector). In order to use the images and products in further studies and assessment, it is really useful to load the individual layers (delineation, grading, hi-resolution colour satellite image, etc.) in a GIS software as TIFF files for example, in addition of having them in a pdf file. - Even the individual satellite bands with metadata and radiometric information (wavelength range, etc.) would be very useful
	- Results from validation reinforced the experience with EMS		- Improve the validation phase for the products
	- Maps are useful for later analysis and damage assessment	- Despite the rapid response, the received maps cannot be used to directly support response activities on the field (restrictions of the satellite mapping system that cannot be avoided) - The time factor is very critical. Result from the activation is often needed within 24h	
	- Large area coverage		
		- Standardisation is sometimes too much and not good	- Consider applying different methods (e.g. produce heat maps for earthquake damage assessment)
	- Timeliness of Rapid Mapping is a strength as the quick delivery benefits emergency management	- Timeliness is a weakness and product delivery must still be improved (is in general sometimes not good)	- Improve the product delivery time - Provide faster access to the products (web services)
Service	- Sentinel-1 data are valuable in terms of	- Sentinel-1 use is not on demand	

Issue category	Strengths	Weaknesses	Suggestions for improvement
dependencies	accuracy and resolutions for rapid mapping or mapping disasters in near real time		
	- Access to several satellite data (Optical imagery, SAR) and high and very high resolution	- Inaccessible raw data	
	- Possibility to use up to date satellite imagery based maps	- Lack of timely satellite imagery for analysis	
Dialogue with the service	- Very good communication during an activation (between the user on the one side and service provider & EC on the other side) - Good support provided by the service both technical and procedural - we appreciate the flow of emails, we do not get lost usually	- Communication issues with the Rapid Mapping service provider (related to email contact) - English speaking proficiency of mapping staff could be improved - Not too many emails please (during activation)	- Service provider should be more proactive in the activation phase - Inform about satellite acquisition times to allow briefing colleagues and being aware of expected map delivery times - Keep the email exchange to the essential (reduce number of emails, group info) - Service provider to take stronger into account AU expressed needs (AOI, scale, forecast) and suggestions for other information sources - Distinguish Authorised User from End User during an activation (technical discussion) - Improve the communication between the End Users and Copernicus-EMS
Dissemination	- Simple dissemination of Maps and Data - Good accessibility of products: - SFTP and/or portal are good - Performance of access platforms is good - deliverables are well organised		- Provide web-services (e.g. WMS, WMTS, WMS-T) that enable to include the satellite images used to create the products in GIS, well as for the products (analysis layers, flood masks, etc.) themselves - Provide .wms and .wfs services (INSPIRE compliant)
Product quality, accuracy	- Overall, the quality of the products is good (especially PDF) - Products were easy to understand (flood extent and evolution)	- Lack of metadata prevented understanding the products - Provision of very different crisis information vector layers was confusing	- Clearly indicate which area was not analysed - Provide metadata on products (including reliability of the crisis information)
		- Service performance seems to depend on the specific event (e.g. for landslides results are highly dependent on the type)	
	- Flood analysis worked very satisfying - Employment of radar data for flood mapping (in particular Sentinel 1)	- Accuracy limitations in urban areas (radar) - Mismatch of flood extent areas with field observations (limitations of radar data)	- Consider combining data for flood mapping to minimise the limitations of radar
	- Laval flow mapping was good	- failed to detect ash (volcanic) - maps are not good for ashes that do not remain years as lava flow	- Improve the method to detect ash fall out

Issue category	Strengths	Weaknesses	Suggestions for improvement
		- Lack of experience dealing with volcanic eruptions	
	- Good integration of satellite and aerial data for hydraulic and geological risk	- Improve the integration of data derived from different sensors (aerial, ground data, thermal data)	
		- Spatial resolution was lower than needed for management operations	
		- Mismatch between disaster peak and image acquisition	- Aim at acquiring the image as closest to the emergency peak as possible
Impact on user workflow	- Overall good impact on the user workflow, operational workflow - Flood products were really useful and were used: 1) to plan response to mosquito outbreaks, 2) for preparedness in an operational way - Good integration in internal geographical information system (Sit DPC), FloodCAT platform (EU Directive) and DEWETRA platform (Early Warning system and monitoring tool) - Good in assisting national authorities, provide an overview on the situation in the first hours and days after the event, assess damages and needs, support the EUCP Team deployed in the field, support funding decisions		- Service portfolio to be enlarged, improve the multi-risk mapping
Aerial pilot study			
Service specifications		- UAV pilot is very welcome with regards to improving timeliness of product delivery	
Dialogue with the service		- Communication about the results of the UAV flight was not very good or clear	
Mapping Validation			
Product quality, accuracy	- Results from validation reinforced the experience with EMS		- Improve the validation phase for the products

2.5 UAV flight demonstration

Speaker: Peter Spruyt (JRC, coordinator of the aerial pilot study)

Due to bad weather conditions the flight demonstration on the JRC UAV test site could not take place Instead an alternative program was worked out in which the technical and practical parts of the fixed wing UAV was explained. An ebee system was demonstrated and camera options shown.

The post processing software to arrive at ortho-rectified imagery and digital surface models from the image shots was explained.

3 General conclusions on the workshop

During the 1.5 day workshop Copernicus EMS users, service providers and coordinators of the Mapping component met to discuss the current status and address the future evolution of the service which is operational since April 2012. While previous user workshops were addressing specific disasters (Flood workshop in October 2013) or aimed at providing an overview on what the service provides and how it works (workshop on 27th April 2015), this year's edition focussed on discussing its status and on sharing views on the future evolution. After the technical coordinators (JRC) provided an overview on the current service, five users presented their experience raising weaknesses and strengths of the service and suggesting improvements. In addition, examples of validation cases were presented and data providers gave an overview on their service element (ESA for image data, EEA for reference, in-situ data).

In the discussions and in particular during the dedicated evolution session at the end of the workshop, all participants were invited to share their views on the presented topics and to reflect on the service. This report summarises the views shared or issues raised during these 1.5 days.

The service is mature and needs to explore possible directions for evolving in line with the state of the art of technologies and user needs. Overall, users are satisfied with the service but also raised a number of suggestions for improvements which would render the service more usable and improve integration in user's workflows. The discussion showed that while on some aspects users seem to agree, they diverge on others. One concrete example was the low quality but fast product in case of Rapid Mapping (First Available Map). Main priorities for the future evolution of the service are fast(er) product delivery, access to imagery used in the production, dissemination of products and imagery through web services, improvement of the product portfolio (more technical products, tailoring to specific risks), and increasing awareness about the service and what it provides (e.g. thematically but also about technical details like delivery formats). While it might be that some of the suggested improvements could be addressed under the current framework contract, for others this would not be possible or it would require amending the current contracts. The EC intends to address those in the coming year using the outcome of this workshop as one of the inputs to its work on the evolution of the service.

Most of the participants expressed the wish[6] to repeat the workshop every year with a similar approach and a preferred duration of two full days. JRC Ispra was perceived as a good workshop location.

[6] Results from the post-workshop survey

Annexes

Table 5. Workshop agenda

15 March 2016

Timing		Item	Speakers
11:00	12:00	Tour JRC Visitors' Centre	VsC staff
12:00	***13:00***	***Lunch***	
13:00	13:15	Welcome and introduction	A. Wania, T. De Groeve, F. Villette
13:15	13:20	Introduction NEXTSPACE study	Stéphane Ourevitch
Session 1: Current status of EMS components			
Update on operations, brief overview on main achievements in 2015			
13:20	13:40	Early Warning Systems EFAS and EFFIS	P. Salamon, J. San Miguel Ayanz
13:40	13:50	Rapid Mapping	Jan Kucera
13:50	14:00	Risk & Recovery Mapping	Peter Spruyt
14:00	14:10	Pilot study on aerial platforms	Peter Spruyt
14:10	14:25	Validation	Marco Broglia
14:25	14:35	Wrap-up questions	All
14:35	***14:50***	***Coffee break***	
Session 2: User experience, suggestions and views			
Presentation and discussion of user experiences with EMS Mapping activations, complemented with results from Validation exercises			
14:50	15:10	User experience **United Kingdom**	Ben Fletcher, Andrew Richman
15:10	15:20	Validation of Rapid Mapping activation for Floods	Massimiliano Rossi
15:20	15:30	Discussion	All
15:30	15:50	User experience **Spain**	Angela Iglesias
15:50	16:00	Validation of Rapid Mapping activation for Fires	Uxue Donezar
16:00	16:10	Discussion	All
16:10	16:25	Risk & Recovery Mapping activations in **Portugal**	Christof Weissteiner
16:25	16:35	Discussion	All
16:35	***16:55***	***Coffee break***	
16:55	17:15	User experience **Italy**	Roberta Onori
17:15	17:25	Validation of Rapid Mapping activation for Land slides	Jonathan Spinoni
17:25	17:35	Discussion	All
17:35	17:50	User experience **Emergency Response and Coordination Centre** (ECHO-ERCC)	Ana-Maria Duta
17:50	18:00	Discussion	All
18:30		***Transfer to hotels and dinner location***	
20:00		***Dinner in Osteria Melograno, Angera (see map)***	

16 March 2016

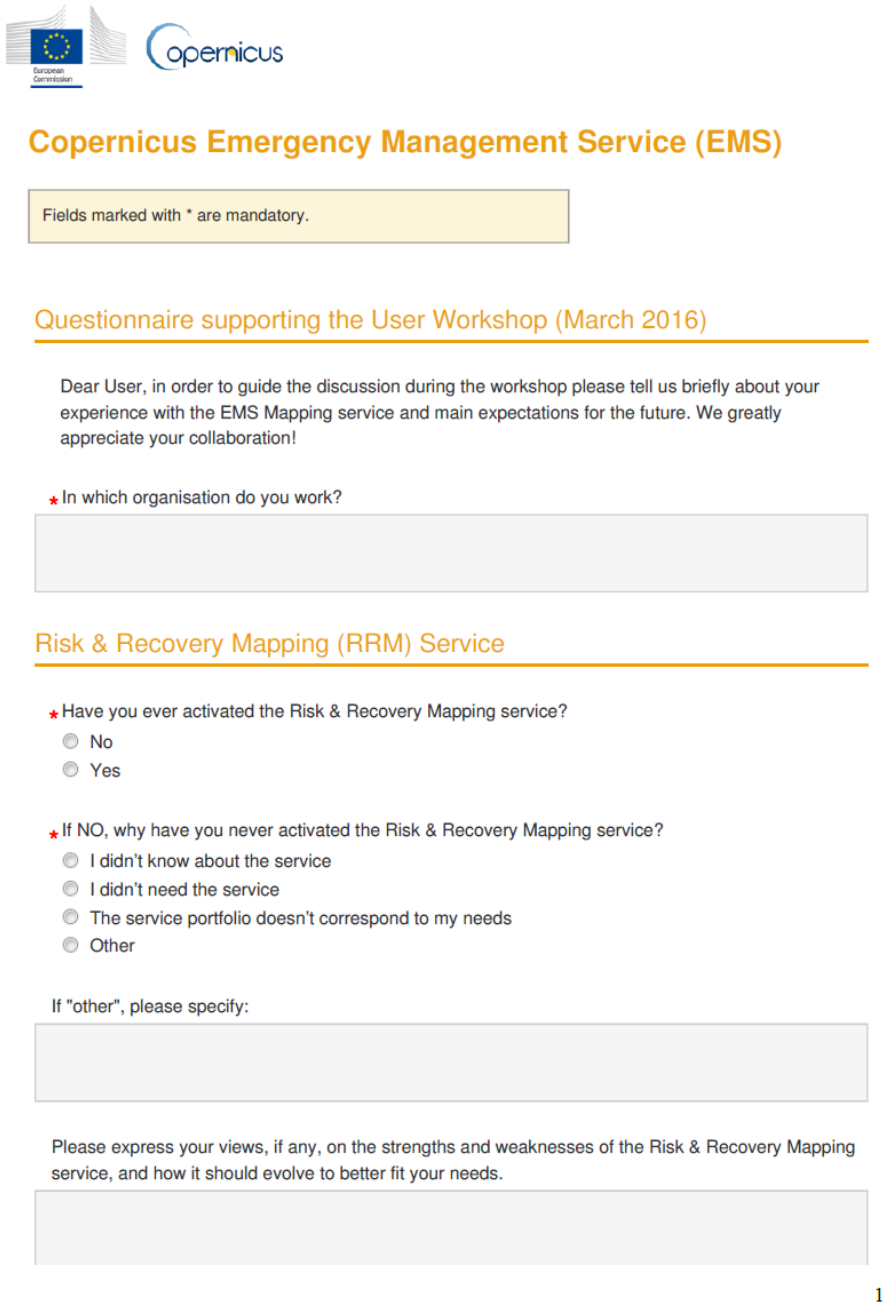
Timing		Item	Speakers
Session 3: Data access, availability and service evolution			
Presentation on the access to image and reference data, EMS products and discussion on the future evolution of the service based on feedback received from users			
09:00	09:20	Earth observation data acquisition & access	Fabrizia Cattaneo
09:20	09:35	Reference In-situ Data	Henrik Steen Andersen
09:35	09:50	Product access and dissemination	Jan Kucera
09:50	10:00	Discussion	All
10:00	***10:20***	***Coffee break***	
10:20	10:40	Cooperation with the International Charter	Francoise Villette
10:40	12:45	Evolution of EMS Mapping - in the current phase (until 02/2019) - in the next phase	Facilitators J. Kucera, M. Broglia, P. Spruyt
12:45	13:00	Conclusions	JRC, GROW
13:00	***14:00***	***Lunch***	
14:00	15:00	UAV flight demonstration (weather permitting)	Peter Spruyt
15:00		***Transfer to airports/train station***	

Table 6. List of workshop participants

Nb	First Name	Last Name	Organisation	Country	Role in EMS
1	Dorothea	AIFANTOPOULOU	Geoapikonisis SA	Greece	Risk & Recovery Mapping service provider
2	Andrea	AJMAR	Information Technology for Humanitarian Assistance, Cooperation and Action (ITHACA)	Italy	Rapid Mapping service provider
3	Henrik Steen	ANDERSEN	European Environment Agency (EEA)	Denmark	Coordination of access to reference data
4	Ahti	AVENT	Ministry of the Interior	Estonia	User
5	Katja	BANOVEC JUROŠ	Administration of the Republic of Slovenia for Civil Protection and Disaster Relief	Slovenia	User
6	Pavol	BARICIC	Ministry of Interior of the Slovak Republic	Slovakia	User
7	Marco	BROGLIA	EC Directorate General Joint Research Centre (JRC)	Italy	Coordinator of Mapping Validation
8	María	CABELLA	Trabajos Catastrales SA	Spain	Validation service provider
9	Fabrizia	CATTANEO	European Space Agency (ESA)	Italy	Coordination of access to satellite data
10	Stephen	CLANDILLON	ICube-SERTIT, Université de Strasbourg	France	Rapid Mapping service provider
11	Vasile	CRACIUNESCU	Romanian National Meteorological Administration	Romania	User
12	Ingrida	DABULSKIENĖ	Fire and Rescue Department under the Ministry of the Interior Authority	Lithuania	User
13	Tom	DE GROEVE	EC Directorate General Joint Research Centre (JRC)	Italy	Acting head of the Global Security & Crisis Management unit
14	Freerk	DIJKSTRA	National Operations Centre	Netherlands	User
15	Uxue	DONEZAR	Trabajos Catastrales SA	Spain	Validation service provider
16	Chiara	DORATI	EC Directorate General Joint Research Centre (JRC)	Italy	Rapid Mapping JRC team
17	Arnaud	DURAND	ICube-SERTIT, Université de Strasbourg	France	Risk & Recovery Mapping service provider
18	Ana-Maria	DUTA	EC Humanitarian Aid & Civil Protection (ECHO), Emergency Response Coordination Centre (ERCC)	Belgium	ERCC on-duty officer
19	Ben	FLETCHER	Cabinet Office, Civil Contingencies Secretariat	UK	User
20	Antoaneta	FRANTZOVA	Ministry of Interior, Earth Observation Center	Bulgaria	User
21	Isabel	GOÑI	Trabajos Catastrales SA	Spain	Validation service provider
22	Domenico	GRANDONI	e-GEOS	Italy	Rapid Mapping service provider
23	Agust Gunnar	GYLFASON	National Commissioner of the Icelandic Police, Department of Civil Protection & Emergency Management	Iceland	User
24	Angela	IGLESIAS	Dirección General de Protección Civil y Emergencias	Spain	User
25	Susanne	INGVANDER	Swedish Civil Contingencies Agency (MSB)	Sweden	User
26	Alex	IRVING	Airbus Defence and Space	UK	Risk & Recovery Mapping service provider
27	Jeppe Vöge	JENSEN	Danish Emergency Management Agency	Denmark	User
28	Alexander	KLAUS	GAF AG	Germany	Rapid Mapping service provider
29	Charalampos	KONTOES	National Observatory of Athens	Greece	Risk & Recovery Mapping service provider
30	Deborah	KORBER	Ministère de l'Intérieur	France	User
31	Jan	KUČERA	EC Directorate General Joint Research Centre (JRC)	Italy	Coordinator of Rapid Mapping
32	Peter	LÁSZLÓ	Ministry of Interior, National Directorate General for Disaster Management	Hungary	User
33	Maria	LEMPER	GeoVille	Austria	Risk & Recovery Mapping service provider

Nb	First Name	Last Name	Organisation	Country	Role in EMS
34	Christophe	LOUVRIER	EC Directorate General Joint Research Centre (JRC)	Italy	Mapping JRC team
35	Fabian	LÖW	Federal Office of Civil Protection and Disaster Assistance (BBK)	Germany	User
36	Lucia	LUZIETTI	e-GEOS	Italy	Rapid Mapping service provider
37	Emilio	MARTORANA	EC Directorate General Joint Research Centre (JRC)	Italy	Rapid Mapping JRC team
38	Tim	MCCARTHY	Maynooth University	Ireland	User
39	Ann-Charlotte	NYLEN	Swedish Civil Contingencies Agency	Sweden	User
40	Roberta	ONORI	Italian Civil Protection Department	Italy	User
41	Stéphane	OUREVITCH	SpaceTec Partners	Belgium	NEXTSPACE service provider
42	Gregorio	PASCUAL	Dirección General de Protección Civil y Emergencias	Spain	User
43	Udrivolf	PICA	SpaceTec Partners	Belgium	NEXTSPACE service provider
44	BOSTJAN	POKLUKAR	Administration of the Republic of Slovenia for Civil Protection and Disaster Relief	Slovenia	User
45	Emanuel	PSAILA	Civil Protection Department	Malta	User
46	Andrew	RICHMAN	Environment Agency	United Kingdom	User
47	Massimiliano	ROSSI	EC Directorate General Joint Research Centre (JRC)	Italy	Validation JRC team
48	Peter	SALAMON	EC Directorate General Joint Research Centre (JRC)	Italy	Early Warning - EFAS project coordinator
49	Jesús	SAN-MIGUEL-AYANZ	EC Directorate General Joint Research Centre (JRC)	Italy	Early Warning - EFFIS project coordinator
50	Ana	SEBASTIAN	GMV Aerospace	Spain	NEXTSPACE service provider
51	Jonathan	SPINONI	EC Directorate General Joint Research Centre (JRC)	Italy	Validation JRC team
52	Peter	SPRUYT	EC Directorate General Joint Research Centre (JRC)	Italy	Coordinator Risk & Recovery Mapping and of the aerial pilot study
53	Pavel	ŠPULÁK	Ministry of the Interior, General Directorate of Fire & Rescue Service of the Czech Republic	Czech Republic	User
54	Alan	STEEL	EC Directorate General Joint Research Centre (JRC)	Italy	Validation JRC team
55	Lena	STERN	European Space Agency (ESA)	Italy	Coordination of access to satellite data
56	Angel	UTANDA	Indra Espacio	Spain	Risk & Recovery Mapping service provider
57	Francoise	VILLETTE	EC Directorate General Internal Market, Industry, Entrepreneurship and SMEs (DG GROW)	Belgium	EMS project coordinator at DG GROW
58	Stefan	VOIGT	German Aerospace Centre (DLR)	Germany	Rapid Mapping service provider
59	Annett	WANIA	EC Directorate General Joint Research Centre (JRC)	Italy	Mapping JRC team, workshop chair
60	Christof	WEISSTEINER	EC Directorate General Joint Research Centre (JRC)	Italy	Risk & Recovery Mapping JRC team
61	Julia	YAGÜE	GMV Aerospace	Spain	NEXTSPACE service provider
62	Federico	ZORZAN	European External Action Service (EEAS)	Belgium	User

Figure 1. Online-survey conducted previous to the workshop in preparation of the evolution discussion on the second day (implemented with EUsurvey).



Copernicus Emergency Management Service (EMS)

Fields marked with * are mandatory.

Questionnaire supporting the User Workshop (March 2016)

Dear User, in order to guide the discussion during the workshop please tell us briefly about your experience with the EMS Mapping service and main expectations for the future. We greatly appreciate your collaboration!

* In which organisation do you work?

Risk & Recovery Mapping (RRM) Service

* Have you ever activated the Risk & Recovery Mapping service?
- No
- Yes

* If NO, why have you never activated the Risk & Recovery Mapping service?
- I didn't know about the service
- I didn't need the service
- The service portfolio doesn't correspond to my needs
- Other

If "other", please specify:

Please express your views, if any, on the strengths and weaknesses of the Risk & Recovery Mapping service, and how it should evolve to better fit your needs.

1

If YES, according to your experience, please tell us which are the main strengths and weaknesses, and your priorities for the evolution of the Risk & Recovery Mapping service (e.g. scope, fitness for purpose, timeliness, accessibility and quality of the results).

Strengths

Weaknesses

Please name top priorities for the evolution of the Risk & Recovery Mapping service

Additional comments on the Risk & Recovery Mapping service, if any

Rapid Mapping (RM) Service

* Have you ever activated the Rapid Mapping service?
  - No
  - Yes

* If NO, why have you never activated the Rapid Mapping service?
  - I didn't know about the service
  - I didn't need the service
  - The service portfolio doesn't correspond to my needs
  - Other

If "other", please specify:

Please express your views, if any, on the strengths and weaknesses of the Rapid Mapping service, and how it should evolve to better fit your needs.

2

If YES, according to your experience, please tell us which are the main strengths and weaknesses, and your priorities for the evolution of the Risk & Recovery Mapping service (e.g. scope, fitness for purpose, timeliness, accessibility and quality of the results).

Strengths

Weaknesses

Please name top priorities for the evolution of the Rapid Mapping service

Additional comments on the Rapid Mapping service, if any

References

Copernicus EMS portal: emergency.copernicus.eu

Workshop website: http://emergency.copernicus.eu/mapping/ems/user-workshop-copernicus-emergency-management-service-user-perspective-current-status-future

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LB-05-16-003-EN-N

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Publications Office

doi:10.2788/2672

ISBN 978-92-79-63450-5